Notice of Allowability	Application No.	Applicant(s)	
	10/591,226	NIELSEN ET AL.	
	Examiner	Art Unit	
	Benjamin M. Baldridge	2831	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *Amendment A, received 12 November 2008*.

2. ☒ The allowed claim(s) is/are *1 - 11*.

3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☒ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☒ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date *20090203* .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

/Benjamin M Baldridge/
Examiner, Art Unit 2831

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Howard Klein, Reg. No. 28,727 on February 3, 2009.

The claims are amended as follows:

Claim 1, lines 2 – 6 are amended to read:

i) providing a two-part metal probe including a first probe part having a first metal element of a first size and a first specific resistivity $\underline{R_C}$, said first probe part constituting an exposed element, and a second probe part having a second metal element of a second size and a second specific resistivity $\underline{R_R}$, said second probe part constituting an environmentally isolated reference element;

Claim 3 is amended to read:

The method according to claim 1, said step xii being performed in accordance with the following equation:

$$\sigma(t) = \sigma(t=0) \cdot \frac{R_R(t)}{R_C(t)} \cdot \frac{R_C(t=0)}{R_R(t=0)}$$

in which σ(t) denotes thickness of an element as a function of time.

Claim 5 is amended to read:

The method according to claim 4, wherein said spread resistance is high if the value of said spread resistance is above ~~0.1 –~~ 1 Ohm,
and ~~being~~ low if the value of the spread resistance is below 0.1 ~~—1~~ Ohm.

Claim 6 is amended to read:

The method according to claim 4, wherein said AC voltage is high if said voltage is higher than ~~approximately~~ 10V.

Claim 8 is amended to read:

A system for diagnosing corrosion risk of a pipe or a pipeline buried in soil due to DC stray currents and/or AC voltages induced in the soil, comprising:

i) a two-part metal probe including a first probe part having a first metal element of a first size and a first specific resistivity, said first probe part constituting an exposed element, and a second probe part having a second metal element of a second size and a second specific resistivity, said second probe part constituting an environmentally isolated reference element;

ii) a switching device ~~operable~~ for the selective electrical connection and disconnection of said two-part metal probe and said pipe or pipeline;

iii) a measuring apparatus electrically connected to said two-part metal probe and including:

an AC current measuring circuit ~~operable~~ for measuring an AC current flowing between a pipe or pipeline and the two-part metal probe when said probe is buried in said soil while said two-part metal probe is electrically connected to said pipe or pipeline;

an AC voltage measuring circuit ~~operable~~ for measuring an AC voltage between said pipe or said pipeline and said two-part metal probe when said two-part metal probe is buried within said soil while said two-part metal probe is electrically disconnected from said pipe or pipeline;

a resistance measuring circuit connected to said AC current measuring circuit and said AC voltage measuring circuit ~~and operable~~ for determining a spread resistance based on Ohm's Law;

a current excitation circuit ~~operable~~ for (a) passing through said cable a first excitation current to said first probe part while said pipe or pipeline and said two-part metal probe are disconnected from one another; (b) for measuring the voltage generated by said first excitation current across said first probe part for measuring the resistance of said first probe part according to Ohm's Law; (c) for passing a second excitation current through said cable to said second probe part while said pipe or pipeline and said two-part probe are disconnected from one another; and (d) for determining the voltage generated by said second excitation current across said second probe part for measuring the resistance of said second probe part according to
Ohm's Law;

a data processor ~~operable~~ for determining an actual corrosion of said first probe part based on the measured resistances of the first and second probe parts according to a mathematical corrosion algorithm;

a storage device ~~operable~~ for storing the measurements made by said AC current measuring circuit, said AC voltage measuring circuit, said spread resistance measuring circuit and said current excitation circuit; and

a diagnosing circuit ~~operable~~ for diagnosing the risk of corrosion of said pipe or pipeline based on an empirical combination of the actual corrosion of said first probe part, said spread resistance and said AC voltage.

2. The following is an examiner's statement of reasons for allowance:

Carr et al. (US Patent 5,821,742) discloses a computerized portable solid state energy meter test system and method of testing in which waveform generating circuitry generates and transmits electrical waveforms and sensing circuitry senses electrical characteristics corresponding to the transmitted waveforms. The test system includes a processor for evaluation of information and a graphic touch screen for displaying information and allowing the user to control the test process.

Nielsen et al. (US Patent Application Publication US 20023/0006148 A1) discloses a method and apparatus for measuring accumulated and instant rate of material loss or material gain, in which measuring accumulated and instant rate material loss or gain is performed by inserting a probe in a measurement environment, causing the probe to

experience metal deposition or corrosion. The apparatus and method allow temperature independent measurement of accumulated or instant rate of material loss or gain.

Pierre et al. (US Patent Application Publication US 2003/0169058 A1) discloses a system to measure the state of corrosion of buried metallic structures continuously in time and length, in which several current electrodes and measuring electrodes are combined with addressable switching devices, a reference electrode and a control system to perform various corrosion measurements and other purposes, such as measuring the level of cathodic protection and adjust the level of protection in the absence or presence of interference currents.

Hilleary et al. (US Patent Application Publication US 2004/0232924 A1) discloses methods and systems for automated pipeline testing, in which a method for testing a cathodic protection system is disclosed. The method includes measuring a magnitude of an out put voltage of the cathodic protection rectifier, transmitting the measured magnitude via a cellular control channel to a remote location, and using the transmitted measurement to determine whether the cathodic protection system is operational.

Hilleary (US Patent 6,774,814 B2) discloses a pipe to soil testing apparatus and methods, in which a test point monitor including a processor and at least one analog sensor periodically measure a voltage and transmit the measured voltage via a cellular control channel.

Balkanli (US Patent 5,389,216) discloses a method for active corrosion analysis in which the parameters of cathodic protection for structures protected by electrolysis or sacrificial anodes are measured. The method includes measurement steps with high

speed data sampling and digitizing in active and passive modes of operation. An active corrosion analyzer is also disclosed.

Winslow et al. (US Patent 6,359,434 B1) discloses a method and system for determining pipeline circumferential and non-circumferential wall loss defects in a water pipeline, in which the method includes parsing a data file into pipe lengths, calculating a phase profile for the data points within each pipe length, locating pinpoint defects in the pipe lengths, and using a total equivalent phase shift to analyze defects.

Takahashi et al. (US Patent Application US 2008/0260324 A1) discloses an active sensor and inspection apparatus and method for pipe deterioration in which an active sensor is positioned on the outside of a pipe; the sensor includes an oscillator that couples electromagnetic waves to the pipe, and the frequency of the waves is swept. An optical fiber sensor detects the waves generated in the pipe.

However, as to claim 1, the prior art of record fails to teach or suggest, singly or in combination, a method of diagnosing corrosion risk of a pipe or a pipeline buried in soil due to DC stray currents and/or AC voltages induced in the soil, including the steps of:

diagnosing the risk of corrosion of said pipe or pipeline based on an empirical combination of the actual corrosion of said first probe part, said spread resistance determined in step vii) and said AC voltage measured in step vi)

and

Determining an actual corrosion of said first probe part based on the measurements performed in steps viii) and ix) according to a mathematical corrosion algorithm

in combination with the other elements of claim 1.

Claims 2 – 7, definite and enabled by the specification, are also allowed due to their dependence on independent claim 1.

As to claim 8, the prior art of record fails to teach or suggest, singly or in combination, a system for diagnosing corrosion risk of a pipe or a pipeline buried in soil due to DC stray currents and/or AC voltages induced in the soil, including:

A diagnostic circuit for diagnosing the risk of corrosion of said pipe or pipeline based on an empirical combination of the actual corrosion of said first probe part, said spread resistance and said AC voltage

in combination with the other elements of claim 8.

Claims 9 – 11, definite and enabled by the specification, are also allowed due to their dependence on independent claim 8.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Benjamin M. Baldridge whose telephone number is 571 270 1476. The examiner can normally be reached on Monday through Friday 7:30AM to 5:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on 571 272 2245. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Benjamin M Baldridge/
Examiner, Art Unit 2831

/Timothy J. Dole/
Primary Examiner, Art Unit 2831